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Chapter 3. R&T Program Requirements

3.1 Overview of Roles and Responsibilities

3.1.1 The roles and responsibilities of senior management are defined in NPD 1000.0, NASA Strategic Management and Governance Handbook, and NPD 1000.3, The NASA Organization.

3.1.2 It is important for the Program Lead and Project Lead to coordinate early and throughout the program and project life cycles with mission support organizations at NASA Headquarters and the implementing Centers. These mission support organizations include legal, procurement, safety, security, finance, export control, human resources, public affairs, international affairs, property, facilities, environmental, aircraft operations, information technology (IT) security, planetary protection, and others. They provide essential expertise and assure compliance with relevant laws, treaties, Executive Orders, and regulations. Refer to Appendix L as a guide to applicable documents.

3.1.3 The Program Lead shall support reviews required by the governing PMC (section 2.3.2), CMC (section 2.3.3), Strategic Acquisition Planning (section 2.2.3), and Special Independent Assessments (sections 3.4.3, 4.5.2.1, and 5.2.5.6.2).

3.1.4 For R&T Programs, the governing PMC and the DA for each KDP shall be as defined in Table 2.3.1.

3.2 Specific Roles and Responsibilities

3.2.1 Specific R&T roles and responsibilities are summarized as follows:

a. NASA Associate Administrator (AA) -- is responsible for oversight of all Agency Programs at the Agency level, chairing the Agency PMC, serving as decision authority/selecting official as specified in Table 2.3.1, and approving the R&T PCA.

b. Mission Directorate Associate Administrator (MDAA) -- is responsible for oversight of all Agency Programs and Projects within the MD, chairing the MD PMC, serving as decision authority/selecting official as specified in Table 2.3.1 and Table 2.3.2, approving Program Plans, approving Cross-Program Research Plans, and appointing and delegating functions within the MD. The MDAA has ultimate responsibility for all budgets, schedules, program requirements, and project-level requirements within the MD.

c. Mission Support Office Director (MSOD) -- is responsible for oversight of all Agency Programs and Projects within the MSO, chairing the MSO governing board, serving as decision authority/selecting official as specified in Table 2.3.1 and Table 2.3.2, approving Program Plans, approving Cross-Program Research Plans, and appointing and delegating functions within the MSO. The MSOD has ultimate responsibility for all budgets, schedules, program

requirements, and project-level requirements within the MSO.

d. Center Director (CD) -- is responsible for establishing, developing, and maintaining the institutional capabilities (processes and procedures, human capital, facilities, aircraft, and infrastructure) required for the execution of programs and projects, including the system of checks and balances to ensure technical and scientific accuracy of the portion of the programs and projects that are conducted at the Center or specifically assigned to the Center by NASA HQ (see section 3.7 for technical authority role and section 3.8 for scientific accuracy role).

e. Chief Engineer -- is responsible for the establishment of policy, oversight, and assessment of the NASA engineering and program/project management process; implements the engineering technical authority process; serves as principal advisor to the Administrator and other senior officials on matters pertaining to the technical capability and readiness of NASA programs and projects to execute according to plans; directs the NASA Engineering and Safety Center (NESC); and directs programs/projects to respond to requests from the NESC for data and information needed to make independent technical assessments and to respond to these assessments.

f. Chief Safety and Mission Assurance Officer -- is responsible to assure the existence of robust Safety and Mission Assurance (SMA) processes and activities through the development, implementation, assessment, and functional oversight of Agency-wide safety, reliability, maintainability, and quality policies and procedures; serves as principal advisor to the Administrator and other senior officials on Agency-wide safety, reliability, maintainability, and quality assurance matters; performs independent program and project compliance verification audits; and implements the SMA technical authority process.

g. Chief Health and Medical Officer (CHMO) -- is responsible for the establishment of policy, oversight, and assessment on all health and medical matters associated with NASA missions and is responsible for implementation of medical/health technical authority process; and serves as principal advisor to the Administrator and other senior officials on health and medical issues related to the Agency workforce.

h. Program Lead -- is responsible for the formulation and implementation of the program per the governing document with the sponsoring MDAA or MSOD. A Program Lead is a generic term for the leader of a program and could be designated as a Program Manager, Program Director, or some other term.

i. Project Lead -- is responsible for the formulation and implementation of the project per the governing document with the Program Lead. A Project Lead is a generic term for the leader of a project and could be designated as a Project Manager, Project Principal Investigator, or some other term.

j. Research Director -- is responsible for the formulation and implementation of cross-program research (see section 3.5) per the governing document with the sponsoring MDAA or MSOD.

3.3 R&T Program Management Process

3.3.1 R&T Program Pre-Formulation

3.3.1.1 The MDAA or MSOD has the authority to start an R&T Program's life cycle (see Figure 2.1.1) by entering into an R&T Program's pre-formulation phase. The MDAA or MSOD is responsible for ensuring the start of new R&T Programs are in line with the Agency's vision and mission, as defined by NPD 1001.0, NASA Strategic Plan. The R&T Program shall follow the life cycle in Figure 2.1.1, including the minimum set of reviews and gate products specified in this NPR.

3.3.1.2 The MDAA, MSOD, or their delegated representative shall assign a Program Lead for Pre-Formulation to manage the effort.

3.3.1.2.1 If the Program Lead resides at a Center, the MDAA, MSOD, or their delegated representative shall coordinate the assignment of the Program Lead with the Center Director.

3.3.1.2.2 The MDAA, MSOD, or their delegated representative shall provide, in writing, a scope of the R&T Program to the Program Lead.

3.3.1.3 The MDAA or MSOD may allocate discretionary funds or utilize funding specifically designated by the Office of the Administrator or Congressional mandate to perform pre-formulation tasks associated with a potential R&T Program. These funds may be allocated by the MD or MSO to specific Centers, managed internally, or may be used to fund external studies associated with a potential R&T Program.

3.3.1.4 The Program Lead is responsible for defining the R&T Program's scope down to at least the project level prior to completion of Pre-Formulation.

3.3.1.5 To minimize duplication of effort and to look for opportunities to augment R&T from other agencies, it is recommended that the Program Lead or designee perform a literature search of R&T prior to investment in new R&T areas (for element within a TD Project, see Gap Analysis, section 4.3.4.2).

3.3.1.6 R&T Program Formulation Authorization Document (FAD).

3.3.1.6.1 The Program Lead shall create the R&T Program FAD using the template provided in Appendix C. The R&T Program FAD is approved by the MDAA or MSOD.

3.3.1.6.2 As a minimum, an R&T Program FAD shall:

a. Contain a statement of purpose for the proposed R&T Program and define its relationship to the Agency's vision and mission, as defined by NPD 1001.0, NASA Strategic Plan.

b. Establish the scope of work to be accomplished.

c. Provide initial constraints, including resources, schedule, and participating organizations within and external to NASA, including international partnerships.

d. Identify the Program Lead who will manage the Formulation effort.

e. Define the approach, resources, and reviews required to conduct R&T Program formulation.

3.3.2 R&T Program Key Decision Point (KDP) 0 -- Approval to Initiate R&T Program Formulation

3.3.2.1 KDP 0 occurs when the MDAA or MSOD approves the R&T Program FAD. This approval authorizes the R&T Program to move from the Pre-Formulation to the Formulation phase. The MDAA or MSOD is responsible for ensuring the R&T Program is formulated and then continues to be in line with the Agency's vision and mission, as defined by NPD 1001.0, NASA Strategic Plan.

3.3.2.2 The OCFO issues all NASA R&T Programs four digit alpha numeric designators once they have confirmed that the R&T Program FAD has been approved by the MDAA or MSOD, and that the MD or MSO has correctly coordinated the appropriate funds for the R&T Program.

3.3.2.3 The OCFO notifies all Agency organizations of an R&T Program entering Formulation by adding a listing of the new R&T Program to the MdM database. Agency-level organizations, such as the Office of the Administrator, PA&E, OCE, OCFO, and OSMA, use the MdM as a summary of all current NASA programs and projects and their key attributes.

3.3.3 R&T Program Formulation

3.3.3.1 R&T Program Commitment Agreement (PCA)

3.3.3.1.1 The R&T PCA is the agreement between the MDAA and the Program DA that authorizes transition from Formulation to Implementation (KDP I). A PCA can be considered an executive summary of the R&T Program Plan. The content of the initial PCA baselined at KDP I reflects the maturity of the R&T Program at that point in the R&T Program's life cycle. Prior to approval of the PCA, the MDAA and the Program DA shall coordinate with any Center Directors contributing to the R&T Program (not including competitively selected activities) to ensure their commitment to support the R&T Program in terms of resources needed by the R&T Program.

3.3.3.1.2 The Program Lead shall create the R&T PCA, using the template provided in Appendix D. The R&T PCA is signed by the MDAA or MSOD and approved by the Program DA.

3.3.3.1.3 As a minimum, an R&T PCA shall:

a. Define the broad R&T Program objectives and its relationship to the Agency's vision and mission, as defined by NPD 1001.0, NASA Strategic Plan.

b. Summarize the technical performance metrics with goals and minimum thresholds needed to achieve the R&T Program objectives.

c. Identify the Program Lead who will manage the implementation effort.

d. Identify schedule, cost, safety, and risk factors.

e. Explain the involvement of R&T Program participants within and external to NASA, including international partnerships and a listing of the specific agreements to be concluded.

f. Specify the independent reviews that will be performed during the life cycle of the R&T Program.

g. Define any optional KDPs (KDP II, III, IV, etc.) required by the Program DA during Implementation (the Program DA may determine that optional KDPs are not needed).

3.3.3.1.4 The Program Lead shall update the R&T PCA every two years. Updates may occur more frequently if there have been significant R&T Program changes as determined by the R&T Program Lead, MDAA, or MSOD so that it remains consistent with NPD 1001.0, NASA Strategic Plan, higher level architectures, and budget authority. Each

revised R&T PCA is reviewed and approved using the same process as the original.

3.3.3.1.5 The R&T PCA may be used to document delegation of authority, as specified in Table 2.3.1.

3.3.3.2 R&T Program Plan.

3.3.3.2.1 The R&T Program Plan is an agreement between the MDAA or MSOD (who has approval authority for the plan) and the Program Lead that details how the R&T Program will be managed and contains the list of specific R&T projects (updated as needed) that are official R&T Program elements. The R&T Program Plan is signed concurrent with KDP I. The content of the initial R&T Program Plan baselined at KDP I reflects the maturity of the R&T Program at that point in the R&T Program's life cycle. Note that it is not uncommon to re-baseline R&T Programs due to the uncertain nature of research and technology. It is possible that this may occur as a result of periodic assessments. The R&T Program Plan is used by the governing PMC in the review process to determine if the R&T Program is fulfilling its agreement.

3.3.3.2.2 The Program Lead shall create the R&T Program Plan, using the template provided in Appendix E. The R&T Program Plan is signed by the Program Lead and approved by the MDAA or MSOD.

3.3.3.2.3 As a minimum, an R&T Program Plan shall:

a. Define the R&T Program goals and specific objectives with clear traceability to the Agency's vision and mission, as defined by NPD 1001.0, NASA Strategic Plan.

b. Identify the main customers/beneficiaries and stakeholders of the R&T Program.

c. Identify the projects under the R&T Program and identify whether they will be managed as Technology Development Projects or R&T Portfolio Projects.

d. Briefly describe the architecture of the R&T Program and its major components.

e. Identify the Program Lead who will manage the implementation effort.

f. Document the R&T Program requirements/objectives, including performance requirements/objectives, and technical success criteria.

g. Provide a schedule of R&T Program activities and events covering the life of the R&T Program.

h. Describe the process by which the R&T Program assures compliance with NASA policies and directives, as well as other applicable requirements.

i. Briefly describe the budget and acquisition approach to be applied at the R&T Program level toward each project.

j. Summarize the risk management approach to be used for the R&T Program.

k. Identify the reviews that the R&T Program will conduct and the approach for the related projects, including Independent Assessments, R&T Program status reviews, and others in response to MDAA, MSOD, or governing PMC requirements.

l. Identify any optional KDPs (KDP II, III, IV, etc.) required by the Program DA during Implementation (the Program DA may determine that optional KDPs are not needed).

3.3.3.2.4 The MDAA or MSOD shall determine whether projects within the R&T Program will be managed as Technology Development Projects or R&T Portfolio Projects. This determination is identified in the R&T Program Plan.

3.3.3.2.5 The R&T Program Plan shall identify those R&T Projects that have been designated as part of a Cross-Program Research (see section 3.5).

3.3.3.2.6 The R&T Program Plan shall document that management responsibility and decision authority for those R&T projects have been assigned to the Cross-Program Research. Further description of those R&T projects is documented in the Cross-Program Research Plan, not the R&T Program Plan.

3.3.3.2.7 The R&T Program Plan shall be updated every two years, but updates may occur more frequently if there have been significant R&T Program changes, as determined by the Program Lead, MDAA, or MSOD. Each revised R&T Program Plan is reviewed and approved using the same process as the original.

3.3.3.2.8 The Program Lead shall ensure the R&T Program Plan and R&T PCA are consistent. If changes are required, the approval process for the applicable document(s) will be followed.

3.3.3.3 Prior to KDP I, a Formulation Review shall be conducted. The Formulation Review has both an internal and external component. The internal component is an R&T Program review to ensure the R&T Program is ready to proceed to KDP I. The external component is an independent assessment and is performed by PA&E under the direction of the selecting official identified in Table 2.3.1, or the selecting official may assign the IA to a separate

organization. The selecting official for the Formulation Review team (see Table 2.3.1) is responsible for the development and approval of the Terms of Reference (ToR) for the Formulation Review. Conflicts during ToR development should be resolved in accordance with section 3.6.

3.3.3.4 The Program Lead shall ensure the R&T Program meets environmental requirements in accordance with NPR 8580.1, Implementing the National Environmental Policy Act and Executive Order 12114.

3.3.3.5 The Program Lead shall consult with the NASA Headquarters National Environmental Policy Act (NEPA) Coordinator during R&T Program formulation to evaluate potential for program cost and schedule savings associated with NEPA strategies.

3.3.3.6 Preference to use Systeme Internationale (SI) Units is desirable. Per NPR 8010.2, Use of the SI (Metric) System of Measurement in NASA Programs, document where and how the SI system is to be used.

3.3.3.7 If an R&T Program contains elements that include hardware used for flight (piloted or unpiloted), flight control software, wind tunnel testing, or systems that could result in potential harm to personnel or property, the Program Lead shall ensure a Safety and Mission Assurance (SMA) plan is developed. The plan identifies and documents program element-specific SMA roles, responsibilities, and relationships with appropriate Headquarters and/or Center- SMA organizations. The plan should reflect the SMA role in areas such as: procurement, management, design and engineering, design verification and test, software design, software verification and test, manufacturing, manufacturing verification and test, operations, and pre-flight verification and test. In many cases, these plans are already established by Center and/or facility procedures for operations such as wind tunnel tests and flight testing and do not need to be developed by the R&T Program. The R&T Program Plan should be used to document when program elements or other entities will need to develop unique SMA plans. However, these plans should still be stand-alone documents.

3.3.3.8 If an R&T Program contains elements that include hardware used for flight (piloted or unpiloted), flight control software, wind tunnel testing, or systems that could result in potential harm to personnel or property, the Program Lead shall ensure a risk management plan is developed. In many cases these plans are already established by Center and/or facility procedures for operations such as wind tunnel tests and flight testing and do not need to be developed by the R&T Program.

3.3.3.9 If a risk management plan does not already exist for a program element containing hardware used for flight (piloted or unpiloted), flight control software, wind tunnel testing, or systems that could result in potential harm to personnel or property, the Program Lead shall ensure a stand-alone risk management plan is developed that includes the content shown in NPR 8000.4, Risk Management Procedural Requirements. The R&T Program Plan should be used to document when unique risk plans need to be developed for program elements because existing plans are not sufficient or when no plan exists. However, these plans should still be stand-alone documents.

3.3.4 R&T Program KDP I -- Approval to Initiate R&T Program Implementation

3.3.4.1 KDP I occurs when the Program DA approves the R&T PCA. This approval authorizes the R&T Program to move from Formulation to the Implementation phase. The Program DA is responsible for ensuring the R&T Program is in line with the Agency's vision and mission, as defined by NPD 1001.0, NASA Strategic Plan.

3.3.5 R&T Program Implementation

3.3.5.1 During R&T Program implementation, the MDAA or MSOD shall:

a. Chair the MD PMC or MSO governing board.

b. Update the R&T PCA, as appropriate.

c. Call periodic R&T Program status reviews, independent assessments, and MD PMC or MSO reviews, as appropriate. It is recommended that these reviews be performed at least annually.

d. Provide oversight of the R&T Program and report the status periodically to Agency-level management, as appropriate.

e. Approve R&T Project FADs and Technology Development/R&T Portfolio Project Plans.

f. Support any reviews, KDPs, or IAs required by this NPR.

g. Perform or delegate any DA functions as required by this NPR.

h. Determine the need to modify or end the R&T Program and make recommendation for termination to the NASA AA.

i. Support Agency PMC activities.

j. Conduct R&T Program completion activities at the end of an R&T Program (see section 3.3.6.1).

3.3.5.2 During R&T Program Implementation, the Program Lead shall:

a. Update the R&T Program Plan, as appropriate.

b. Execute the R&T Program Plan.

c. Update all required interagency and international agreements, as appropriate.

d. Conduct planning, program-level systems engineering, and integration, as appropriate, to support the MD in initiating the project selection process.

e. Support the MDAA in the selection of projects, either assigned or through a competitive process.

f. Approve R&T Project FADs and Technology Development/R&T Portfolio Project Plans.

g. Plan, prepare for, and support R&T Program status reviews, independent assessments, and governing PMC reviews, as appropriate.

h. Provide oversight of the projects within the R&T Program and report their status periodically.

i. Review and approve annual project budget submission inputs and prepare annual R&T Program budget submissions.

j. Conduct R&T Program completion activities for each project in accordance with the project life cycle (see sections 4.6 and 5.2.6).

k. Support any reviews, KDPs, or IAs required by this NPR.

l. Perform any DA functions, as required by this NPR or delegated by the DA.

3.3.5.3 Optional KDPs (KDP II, III, IV, etc.) may be added per Program DA discretion during Implementation. The Program Lead shall document any optional KDPs in the R&T PCA and R&T Program Plan. This should include determination of gate products required prior to the optional KDPs. The Program DA may determine that optional KDPs are not needed.

3.3.5.4 Results of NASA Scientific and Technical Information (STI) are published in the NASA STI Report series, whenever possible. NASA policy and requirements for STI are described in the NPD 2200.1, Management of NASA Scientific and Technical Information and NPR 2200.2, Requirements for Documentation, Approval, and Dissemination of NASA Scientific and Technical Information.

3.3.6 R&T Program KDP n -- Approval to Discontinue R&T Program

3.3.6.1 KDP n occurs when the Program DA authorizes an R&T Program to end. The Program DA should coordinate any recommendations of the MDAA or MSOD and the Program Lead. The decision of the Program DA to discontinue an R&T Program is documented in written form, including any recommendations relevant to existing contractual relationships, disposal of assets, manpower support, and timeframe of closure process.

3.4 R&T Program Status Reviews and Independent Assessments (IA)

3.4.1 Independent Assessments (IAs) occur as part of the R&T Program life cycle and will be reported to the Agency PMC at least biennially. The individual specified in Table 2.3.1 is responsible for developing the Terms of Reference (ToR) for the IA, which will include a description of the IA process and IA team membership. Members of the IA team will be selected in one of two ways: (1) by the individual specified in Table 2.3.1, or (2) by an external IA organization such as the National Research Council. In either case, the Associate Administrator for PA&E will ensure that both the IA process and IA team membership are independent and objective, and will be a co-signatory on the ToR. Furthermore, for those R&T Programs that include a large-scale (>$250M) fully integrated Technology Development system (e.g., X-33), the Chief Engineer will also be a co-signatory of the ToR. See the Quality Assessment Process and Performance Measurement Metrics in NPR 1080.1, NASA Science Management for additional guidance on assessments.

3.4.2 The ToR should be provided to the Program Lead prior to conducting the IA. Conflicts during ToR development should be resolved in accordance with section 3.6.

3.4.3 The NASA AA, MDAA, or MSOD may also authorize special independent assessments at any time in an R&T Program's life cycle. A ToR should be developed for each special independent assessment. The ToR should be developed by the individual(s) who authorize the special independent assessment in coordination with the MDAA or MSOD (or designee).

3.4.4 R&T Program status reviews are conducted periodically, as documented in the R&T Program Plan. These reviews can also be called by the NASA AA, MDAA, or MSOD at any time to determine the need to modify or end

the R&T Program.

3.5 Cross-Program Research Management

3.5.1 The MDAA or MSOD may decide to collectively manage R&T Portfolio Projects taken from various Agency programs within the MD or MSO. This choice may be made when research is more efficiently solicited across program lines or a DA is needed who is independent from the Agency program. An independent DA may be needed to prevent the appearance of bias when a Center is competing for research activities that are under the purview of a Program Lead from that particular Center. Cross-Program Research is managed by a Research Director (typically at NASA HQ) and may be referenced elsewhere in Agency documentation as a "Research Program."

3.5.2 The Research Director shall create a Cross-Program Research Plan that encompasses all the R&T Portfolio Projects within his/her purview, using the template provided in Appendix F. The Cross-Program Research Plan is signed by the Research Director and approved by the MDAA or MSOD.

3.5.3 As a minimum, a Cross-Program Research Plan shall:

a. Define the Cross-Program Research goals and specific objectives with clear traceability to the Agency's vision and mission, as defined by NPD 1001.0, NASA Strategic Plan.

b. Identify the main customers/beneficiaries and stakeholders of the Cross-Program research.

c. Briefly describe the management structure of the Cross-Program Research and associated Portfolio Projects.

d. Identify the Research Director who manages the Cross-Program Research.

e. Define the selection process for awarding R&T, including the Selection Official.

f. Document the Cross-Program Research requirements/objectives, including performance requirements/objectives, technical success criteria, and KPPs.

g. Provide a schedule of Cross-Program Research activities and events.

h. Describe the process by which the Cross-Program Research ensures compliance with NASA policies and directives, as well as other applicable requirements.

i. Briefly describe the budget and acquisition approach to be applied to the Cross-Program Research.

j. Define a process for determining openly competed, internally competed, and directed investments.

k. Summarize the risk management approach to be used for the Cross-Program Research.

l. Include information on the specific programs that are transferring R&T Portfolio Project management to the Research Director.

m. Describe the reviews that the Cross-Program Research will conduct, including Formulation Reviews, peer reviews, and other independent assessments, in response to MDAA, MSOD, or governing PMC requirements.

n. Define any optional KDPs (KDP II, III, IV, etc.) required by the DA during Implementation or determine that these optional KDPs are not needed.

3.5.4 The Program Lead, Research Director, and MDAA or MSOD each have specific responsibilities when a Cross-Program Research Delegation occurs.

3.5.4.1 The Program Lead shall ensure the Program Plan reflects the delegation of R&T Portfolio Project management authority to the Research Director.

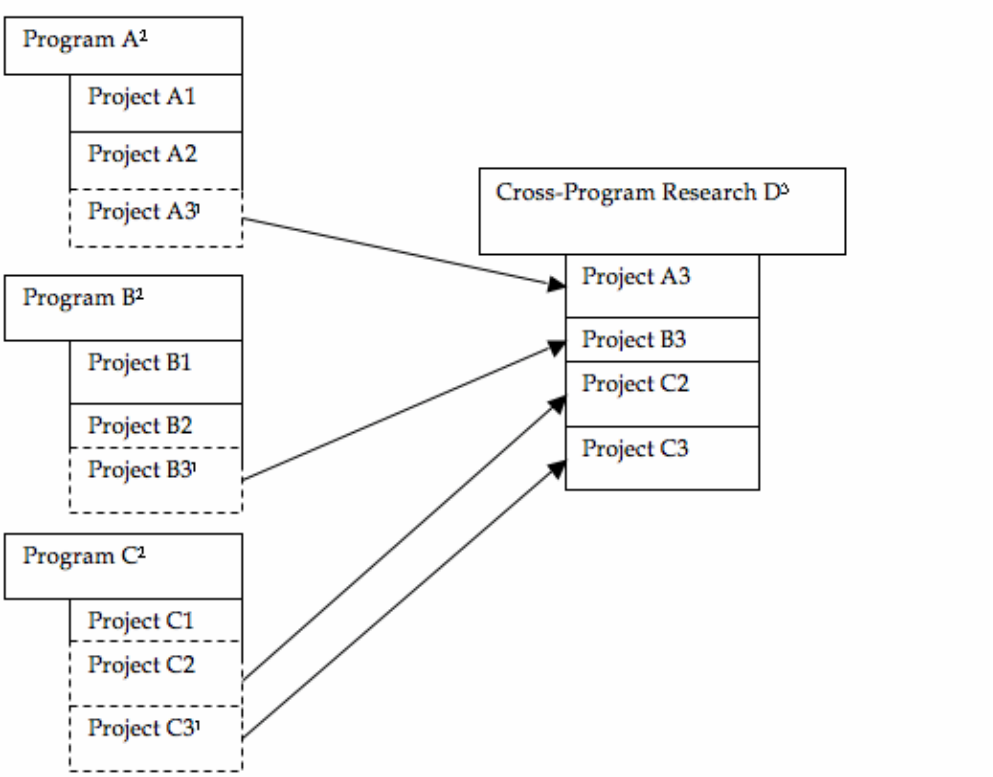
3.5.4.2 The Research Director shall ensure the Cross-Program Research Plan reflects the delegation of R&T Portfolio Project management authority from the Program Lead.

3.5.4.3 The MDAA or MSOD is responsible to the Program's DA and Agency PMC for the entire Program regardless of any Cross-Program Research agreement. The Program Lead, and the Research Director if there is a Cross-Program Research agreement, are responsible to the MDAA or MSOD. The Research Director shall support the MDAA or MSOD with any necessary reviews or requirements placed upon the program by the Program DA and Agency PMC.

3.5.5 The Research Director oversees the R&T Portfolio Projects within his/her purview as a Program-like Lead, may act as the MDAA or MSOD delegated DA for the R&T Portfolio Projects, and assigns in coordination with the MDAA or MSOD the management of specific R&T Portfolio Projects to R&T Portfolio Project Leads. Figure 3.5.1 illustrates the relationship between Agency programs and Cross-Program Research.

3.5.6 The Research Director shall use the R&T Program Requirements (Chapter 3) and the R&T Program Life Cycle

(Figure 2.1.1) with changes specified in Table 3.5.1 as a guideline for managing Cross-Program Research.



[1]Projects A3, B3, C2, and C3 are R&T Projects. The MDAA or MSOD has directed that R&T Projects A3, B3, C2, and C3 be managed as R&T Portfolio Projects under Cross-Program Research D. [2]Program Leads A, B, and C are responsible to the MDAA or MSOD. Each Program Lead is responsible for and has authority over the projects within each program that have not been assigned as Cross-Program Research D. [3]Research Director D is responsible to the MDAA or MSOD. Research Director D is responsible for and has authority over the R&T Portfolio Projects (including budgetary) within Cross-Program Research D.

Figure 3.5.1 Relationship between Agency Programs and Cross-Program Research

	R&T Program (Figure 2.1.1)	**Cross-Program Research** (Figure 2.1.1)	**Specific Exceptions for Cross-Program Research**
Approving Official for Start and KDP 0	MDAA (or MSOD)	MDAA (or MSOD)	An R&T FAD is not required. KDP 0 occurs when the assignment of the Research Director is formally made.
Program Decision Authority (DA) *(KDP I, II, III, ... n)*	NASA AA[1,2]	MDAA or MSOD[2]	An R&T PCA is not required. KDP I occurs when the MDAA or MSOD approves the Cross-Program Research Plan.

Selecting Official for Formulation Review Team	NASA AA[1]		A Formulation Review is not required.
Selecting Official for Independent Assessment Team	MDAA or MSOD	MDAA or MSOD	
Governing PMC	Agency PMC[3]	MD PMC or MSO equivalent	
Governing Document	R&T Program Plan (Appendix E)	Cross-Program Research Plan (Appendix F)	

[1]The NASA AA can delegate responsibility to the MDAA or MSOD. [2]Optional KDPs (KDP II, III, IV, etc.) may be added per DA discretion during implementation. The DA may also determine these optional KDPs are not needed. [3]
[3]The Agency PMC can delegate oversight responsibility to the MD PMC or MSO equivalent. The Program, Project, and Cross-Program Research Plans must reflect modifications due to the comments above and document the attendant rationale for the change. The MDAA or MSOD is responsible to the Program DA and Agency PMC for the entire Program regardless of any Cross-Program Research agreement. The Program Lead, and the Research Director if there is a Cross-Program Research agreement, are responsible to the MDAA or MSOD. The Research Director supports the MDAA or MSOD with any necessary reviews or requirements placed upon the program by the Program DA and Agency PMC.

Table 3.5.1 Cross-Program Management Structure

3.6 Process for Handling Dissenting Opinions

3.6.1 NASA teams must have full and open discussions with all facts made available in order to understand and assess issues. Diverse views are to be fostered and respected in an environment of integrity and trust with no suppression or retribution.

3.6.2 Unresolved issues of any nature (e.g., programmatic, safety, engineering, acquisition, and accounting) within a team should be quickly elevated to achieve resolution at the appropriate level. At the discretion of the dissenting person(s), a decision may be appealed to the next higher level of management for resolution. Dissenting opinions raised by a Technical Authority (TA) are handled by the process set forth in section 3.7

3.6.3 When appropriate, the concern is documented by including agreed-to facts, discussion of the differing positions with rationale and impacts and the parties' recommendations, approved by the representative of each view, concurred by affected parties, and provided to program/project management and the appropriate TA with notification to the second higher level of management. In cases of urgency, an oral presentation (including the information stated above) with all affected organizations in attendance and with advance notification to the second higher level of management may be utilized with documentation follow-up.

3.6.4 Management's decision/action on the memorandum (or oral presentation) is documented and provided to the dissenter and to the notified managers, and becomes part of the program/project record. If the dissenter is not satisfied with the process or outcome, the dissenter may appeal to the next higher-level of management. The dissenter has the right to take the issue upward in the organization, even to the NASA Administrator if necessary.

3.7 Technical Authority (TA)

3.7.1 NASA has adopted two basic authority processes: the programmatic authority process and the technical authority process. The programmatic authority process is largely described by the roles and responsibilities of the NASA AA, MDAAs (or MSODs), and program and project leads in this document. The technical authority process is established in NPR 7120.5, NASA Space Flight Program and Project Management Requirements. The technical authority process is another means by which NASA maintains the technical integrity of its R&T programs and

projects.

3.7.2 The technical authority process provides for the selection of individuals at different levels of responsibility, who maintain independent authority to ensure that proper technical standards are utilized in the performance of any R&T Program or project tasks at the Center. In this document, the term Technical Authority (TA) is used to refer to such an individual, but is also used (without capitalization) to refer to all the elements of the technical authority process taken together. A key aspect of the technical authority process is that the TAs are funded independently of the program/project. There are three distinct types of TAs: Engineering TAs, SMA TAs, and Health and Medical TAs, each of whom is discussed in this section. A key aspect of the technical authority process is that the TAs are funded independently of the program/project.

3.7.3 The Engineering Technical Authority establishes and is responsible for the engineering design processes, specifications, rules, best practices, etc., necessary to fulfill programmatic mission performance requirements. The NASA Chief Engineer provides overall leadership of the engineering technical authority process for NASA R&T programs and projects. This includes policy direction, requirements, and verification of technical authority process implementation. The NASA Chief Engineer hears appeals of the Engineering Technical Authority's decisions when they cannot be resolved at lower-levels.

3.7.4 The SMA Technical Authority establishes and is responsible for the SMA design processes, specifications, rules, best practices, etc., necessary to fulfill programmatic mission performance requirements. To ensure independence, SMA Technical Authority personnel are organizationally separate from the program/project. The Center SMA Director is responsible for establishing and maintaining institutional SMA policies and practices, consistent with Agency policies and standards. The Center SMA Director is also responsible for assuring that the program/project complies with both the program/project and Center SMA requirements.

3.7.5 The Health and Medical Technical Authority is the NASA Chief Health and Medical Officer (CHMO). The CHMO delegates that authority to the Center Chief Medical Officer who is responsible for assuring that the program/project complies with health and medical requirements through the process specified in the Center Health and Medical Authority (HMA) implementation plan, which is compliant with NPD 8900.5, NASA Health and Medical Policy for Human Space Flight Exploration. The CHMO hears appeals of HMA decisions when issues cannot be resolved below the Agency level.

3.7.6 Each Center Director is responsible for the technical integrity of R&T activities and investigations that are assigned or awarded to that Center. The Center Director is the Center Engineering Technical Authority responsible for Center engineering verification/validation processes, specifications, rules, practices, and other activities, necessary to ensure the technical integrity of R&T programs and projects accomplished by the Center. The Center Engineering Technical Authority approves waivers and changes in Center requirements. The Center Director may delegate Center engineering technical authority implementation responsibility to an individual in the Center's engineering leadership. Due to the nature of R&T, the technical authority requirements for R&T programs and projects are not as specific as for space flight programs and projects. The Center Director appoints personnel, as needed, to fill the TA roles at the Center. These roles are not pre-defined in this document because they may vary greatly depending on the nature and level of effort of the R&T programs and projects.

3.7.7 Depending on the scope of R&T work being performed at the particular Center, the TA may establish periodic independent reviews. However, the scope of these reviews should reflect the R&T work being accomplished at the Center. Whenever possible, the TA independent reviews should be coordinated with planned program/project reviews for efficiency. There may be cases when it is advantageous for several Centers to work together to come up with a means of maintaining technical integrity for efforts that are not center-specific. Therefore, it is possible for several Centers to work together to conduct one TA independent review of a piece of work.

3.7.8 The day-to-day involvement of the TA in program/project activities should ensure that any significant views from the TA will be available to the program/project in a timely manner and should be handled during the normal program/project processes. The ultimate responsibility for program/project success in conformance with governing requirements remains the responsibility of the Program/Project Lead.

3.7.9 Infrequent circumstances may arise when the Technical Authority or the Program/Project Lead may disagree on a proposed programmatic or technical action and judge that the issue rises to a level of significance that the next higher level of management should be involved. In such circumstances:

a. The Program/Project Lead has the authority to make a decision while resolution is attempted at the next higher level of Programmatic and Technical Authority.

b. Resolution should occur prior to implementation, whenever possible. However, the Program/Project Lead may proceed at risk in parallel with pursuit of resolution if deemed in the best interest of the program/project. In such circumstances, the next higher level of Programmatic and Technical Authority would be informed of the decision to proceed at risk.

c. Resolution should be attempted at successively higher levels of Programmatic Authority and Technical Authority until resolved. Final appeals are made to the Office of the Administrator.

3.8 Research Practices

3.8.1 All R&T projects, activities, and investigations are conducted in accordance with established research practices and NASA's standards to ensure the quality and acceptability in the community of the research results. Such standards and related requirements regarding NASA sponsored research are provided in NPR 1080.1, NASA Science Management.

3.8.2 Each Center Director is responsible for the conduct of R&T activities and investigations that are assigned or awarded to that Center and to ensure that the Center follows appropriate practices. The Center Director is responsible for Center scientific processes, specifications, rules, practices, and other activities, necessary to ensure the quality of results from R&T programs and projects accomplished by the Center. The CD may delegate Center responsibility to an individual in the Center's leadership.

3.8.3 Infrequent circumstances may arise when the Center leadership or the Program/Project leadership may disagree relating to the conduct of R&T that the issue rises to a level of significance that the next higher level of management should be involved. In such circumstances, resolution should be attempted at successively higher levels of Programmatic Authority and Center Leadership, in accordance with section 3.6, until resolved. Final appeals are made to the Office of the Administrator.

3.9 Unsolicited Proposals

3.9.1 The Program Lead shall handle unsolicited proposals in accordance with 48 CFR, Federal Acquisition Regulation, Subpart 15.6, Unsolicited Proposals; NPR 5100.4, Federal Acquisition Regulation Supplement (NASA/FAR Supplement) [48 CFR 1800-1899], Subpart 1815.6, Unsolicited Proposals; and NPR 5800.1, Grant And Cooperative Agreement Handbook (14 CFR 1260). See NPR 1080.1, NASA Science Management for additional guidance.

3.10 R&T Misconduct

3.10.1 R&T misconduct means fabrication, falsification, or plagiarism in proposing, performing, or reviewing R&T, or in reporting R&T results. R&T misconduct does not include honest error or differences of opinion. The NASA team, including the Program and Project Leads, shall handle allegations of R&T misconduct following processes established in NPR 1080.1, NASA Science Management and 14 CFR Part 1275, Research Misconduct.

3.11 Waiver Approval Authority

3.11.1 Waivers to NPR 7120.8 requirements may be granted by the officials shown in Table 3.11.1.

Legend	R Recommends	A Approves	I Informed

	Project Lead	Program Lead	Center Director	MDAA	Chief Engineer	NASA AA	Approval Authority for Waivers with Dissent
Programs			A	A		I	NASA
Cross-Program Research				A		I	NASA
Technology Development Projects	R		A	A	A		NASA
Portfolio Projects	R		A	A		I	NASA

Table 3.11.1 Waiver Approval for R&T Programs and Projects

3.11.2 Requests for waivers to NPR 7120.8 requirements are documented and submitted for approval using the NPR 7120.8 Waiver Form shown on the next page. (The form is available electronically on the Polaris Website at https://polaris.nasa.gov).

3.11.3 Evaluation and disposition of all other requirements change requests and waivers shall comply with the following:

a. The organizations and the organizational levels that agreed to the establishment of a requirement must agree to the change or waiver of that requirement, unless this has been formally delegated elsewhere.

b. The next higher Programmatic Authority and Technical Authority are informed in a timely manner of change requests or waivers that could affect that level.

NPR 7120.8 Waiver Form

Name of Program or Project Requesting Waiver:	Date of Request:	Date Waiver is Needed:
Name and Organization of Initiator:	Requirement to be Waived:	
Specific Deliverable Affected:	Waiver To: € Policy € Procedure € Requirement € Other € Additional information is attached	
Original Requirement of Document to be Waived (list Appropriate Sections or Text):		
Waiver Requested:		
Reason/Justification (Attach additional information, if necessary):		
Risk Assessment of the Program and Project if Waiver is Approved:		

Required Signatures	Signature	Date	Approved (Yes/No)
Project Lead			
Program Lead (Research Director)			
Center Director			
Mission Directorate AA			
NASA Chief Engineer			
NASA AA (if required)			

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